

Abstract

Space Interferometry Mission: New System Engineering Approaches, Tools, Models and Testbeds.

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In 2005, NASA's Origins Program will launch the Space Interferometry Mission (SIM), a 10 meter optical interferometer instrument, into a circular 900 km earth orbit. This instrument will comprise of three collinear optical interferometers whose prime mission objectives are to perform astrometric measurements of unparalleled accuracy and to perform rotational synthesis imaging of other planetary systems.

To deal with the huge technical challenges of developing this instrument, innovative approaches to System Engineering are being tested and applied in order to achieve our target performance objectives. Defining requirements flow down from the highest system level to the detailed equipment specifications demands a tracing capability that has not been previously available or maintainable on past projects. The SIM System Engineering activity has chosen to utilize a requirements tracing tool to help it track changes and, hopefully, limit volumes of documentation that have become burdens in the past. Additionally, cross-cutting system models will be applied using new processes and infrastructure being instituted at JPL.

Detailed models of optical systems, structural dynamics and thermal control systems are being implemented in an integrated fashion. The fidelity of these models will be verified in a series of evolving hardware and software testbeds that will culminate in a functioning ground version of the flight system. This testbed, supported by a separate technology program, will validate the system level requirements on astrometric performance, visibility and throughput. SIM will be one of the first missions to apply all of these techniques to enhance design detail and mitigate or retire risk early in its development cycle.